<u>CLAIMS</u>

The embodiments for which an exclusive property or privilege is claimed are defined

as follows:

1   1.   An apparatus for voice activated control of an electrical device, the apparatus

2   comprising:

              receiving means for receiving at least one audio command generated by a user,

3   the at least one audio command having a command word portion and a pause portion, each of

4   the audio command portions being at least one syllable in length;

5

6   voice recognition data having a command word portion and a pause portion,

7   each of the voice recognition data portions being at least one syllable in length;

8   voice recognition means including a Hidden Markov Model for comparing said

9   command word portion and said pause portion of said at least one received audio command

10   with said command word portion and said pause portion, respectively, of said voice

11   recognition data, said voice recognition means generating at least one control signal based on

12   said comparison; and

13   power control means for controlling power delivered to an electrical device,

14   said power control means being responsive to said at least one control signal generated by said

15   voice recognition means for operating the electrical device in response to said at least one

16   audio command generated by the user.

1   2.   The apparatus of claim 1, and further comprising means for analyzing the

2   pause portion of the received audio command for spectral content, and further wherein said

3   voice recognition means prevents operation of the electrical device when the spectral content

4   is dynamic.

1   3.   The apparatus of claim 1, wherein said receiving means receives background

2   noise data in conjunction with said audio command, and further comprising means for

3   generating a command word score and a background noise score based on the comparison of

4   the received audio command to the voice recognition data and the background noise data,

5   respectively, said voice recognition means generating said at least one control signal when said

6   command word score exceeds said background noise score.

1   4.   The apparatus of claim 3, and further comprising:

2   means for analyzing the command word portion of the received audio

3   command and the background noise data for energy content; and

4   means for comparing the energy content of the command word portion to the

5   energy content of the background noise data and generating a corresponding energy

6   comparison value;

7   wherein said voice recognition means prevents the generation of said at least

8   one control signal when said energy comparison value is below a predetermined level.

1   5.   The apparatus of claim 1, wherein said receiving means receives background

2   noise data in conjunction with said audio command, and further comprising:

3   means for analyzing the command word portion of the received audio

4   command and the background noise data for energy content; and

5   means for comparing the energy content of the command word portion to the

6   energy content of the background noise data and generating a corresponding energy

7   comparison value;

8   wherein said voice recognition means prevents the generation of said at least

9   one control signal when said energy comparison value is below a predetermined level.

1   6.   The apparatus of claim 1, wherein each of said at least one audio command and

2   said voice recognition data comprises at least first and second command word portions

3   separated by said pause portion and further comprising a second pause portion having at least

4   one syllable in duration before said first command word portion and a third pause portion

5   having at least one syllable in duration after said second command word portion.

1   7.   The apparatus of claim 1, wherein the voice recognition means further

2   including a microcontroller with a fixed-point embedded microprocessor , the microprocessor

3   is chosen from the group of 8-bit and 16-bit MCU microprocessors.

1   8.   A method of activating an electrical device through at least one audio

2   command from a user, the method comprising the steps of:

3   recording voice recognition data having a command word portion and a pause

4   portion, each of the voice-recognition data portions being at least one syllable in length;

5   receiving at least one audio command from a user, the at least one audio

6   command having a command word portion and a pause portion, each of the audio command

7   portions being at least one syllable in length;

8   comparing said command word portion and said pause portion of said at least

9   one received audio command with said command word portion and said pause portion,

10   respectively, of said voice recognition data;

11   generating at least one control signal based on said comparison; and

12   controlling power delivered to an electrical device in response to said at least

13   one control signal for operating the electrical device in response to said at least one received

14   audio command.

1   9.   The method of claim 8, wherein the step of recording voice recognition data

2   includes recording the voice of a user while the user utters said at least one audio command.

1   10.   The method of claim 8, and further comprising the steps of:

2   analyzing the pause portion of the received audio command for spectral

3   content; and

4   preventing operation of the electrical device when the spectral content is

5   dynamic.

1   11.   The method of claim 8, and further comprising the steps of:

2   receiving background noise data in conjunction with receiving said at least one

3   audio command;

4   comparing the background noise data to the at least one received audio

5   command;

6   generating a command word score from the comparison of the received audio

7   command to the voice recognition data;

8   generating a background noise score based on the comparison of the received

9   audio command to the background noise data; and

10   generating said at least one control signal when said command word score

11   exceeds said background noise score.

1   12.   The method of claim 11, and further comprising:

2   ascertaining a first energy content for the command word portion of the

3   received audio command;

4   ascertaining a second energy content for the received background noise data;

5   comparing the first and second energy contents and generating an energy

6   comparison value; and

7   preventing the generation of said at least one control signal when said energy

8   comparison value is below a predetermined level.

1   13.   The method of claim 11, wherein the step of generating a command word

2   score includes assigning a word entrance penalty to the command word portion and the pause

3   portion.

1   14.   The method of claim 13, wherein the word entrance penalty of the pause

2   portion is negative.

1   15.   The method of claim 8, and further comprising:

2   receiving background noise data in conjunction with receiving said at least one

3   audio command;

4   ascertaining a first energy content for the command word portion of the

5 received audio command;

6   ascertaining a second energy content for the received background noise data;

7   comparing the first and second energy contents and generating a corresponding

8 energy comparison value; and

9   preventing the generation of said at least one control signal when said energy

10 comparison value is below a predetermined level.

1   16.   The apparatus of claim 8, wherein each of said at least one audio command and

2 said voice recognition data comprises at least first and second command word portions

3 separated by said pause portion.

1   17.   The apparatus of claim 14, and further comprising a second pause portion

2 having at least one syllable in duration before said first command word portion and a third

3 pause portion having at least one syllable in duration after said second command word

4 portion.

1   18.   An apparatus for voice-activated control of an electrical fixture, the apparatus

2 comprising:

3   receiving means for receiving audio data generated by a user;

4   voice recognition means for determining if the received audio data is a

5 command word for controlling the electrical fixture, the voice recognition means including a

6 microcontroller with a fixed-point embedded microprocessor, a speech recognition system

7 operably associated with the microcontroller and including a Hidden Markov Model for

8 comparing data points associated with the received audio data with data points associated

9   with voice recognition data previously stored in the voice recognition means, said voice

10   recognition means generating at least one control signal based on said comparison when said

11   comparison reaches a predetermined threshold value; and

12   power control means for controlling power delivered to the electrical fixture,

13   said power control means being responsive to said at least one control signal generated by said

14   voice recognition means for operating the electrical fixture in response to said at least one

15   audio command generated by the user.

1   19.   The apparatus of claim 18, wherein the microprocessor is chosen from the

2   group of 8-bit and 16-bit MCU microprocessors.

1   20.   The apparatus of claim 19, wherein the microcontroller further includes an

2   analog to digital (A/D) converter for transforming the received voice data to digital data, a

3   Read Only Memory (ROM) bank, a Static Random Access Memory (SRAM) bank, and

4   general purpose Input-Output (I/O) ports.

1   21.   The apparatus of claim 19, and further comprising a printed circuit board, the

2   receiving means, the microcontroller, and the power control means being mounted on the

3   printed circuit board.

1   22.   The apparatus of claim 18, wherein the electrical fixture is a lighting fixture,

2   and the power control means controls power delivered to said lighting fixture.

1   23.   The apparatus of claim 22, wherein the power control means includes a control

2   circuit for turning on, dimming, and turning off said lighting fixture in response to different

3   audio data uttered by a user.

1   24.   The apparatus of claim 18, and further comprising:

2   means for adjusting the predetermined threshold value to thereby cause a

3   control signal to be generated by said voice recognition means when the audio data generated

4   by the user varies from the previously stored voice recognition data.

1   25.   An apparatus for voice-activated control of an electrical device, the apparatus

2   comprising:

3   receiving means for receiving audio data generated by a user;

4   voice recognition means for determining if the received audio data is a

5   command word for controlling the electrical device, the voice recognition means including a

6   microprocessor for comparing the received audio data with voice recognition data previously

7   stored in the voice recognition means, said voice recognition means generating at least one

8   control signal based on said comparison when said comparison reaches a predetermined

9   threshold value;

10   power control means for controlling power delivered to the electrical device,

11   said power control means being responsive to said at least one control signal generated by said

12   voice recognition means for operating the electrical device in response to said at least one

13   audio command generated by the user; and

14   means for adjusting the predetermined threshold value to thereby cause a

15   control signal to be generated by said voice recognition means when the audio data generated

16   by the user varies from the previously stored voice recognition data.

1   26.   The apparatus of claim 25, wherein the microprocessor is chosen from the

2   group of 8-bit and 16-bit embedded MCU microprocessors.

- 35 -